RESEARCH HIGHLIGHT

November 2004

Socio-economic Series 04-038

APPLYING FUSED GRID PLANNING IN STRATFORD, ONT.

INTRODUCTION

The City of Stratford, in the heart of southwestern Ontario, was laid out according to some of the most historic town planning designs. More recently, Stratford, in its continuing quest to maintain a well-functioning, vibrant city, has investigated a new planning model, the *Fused Grid*, as a part of the city's *Northeast Secondary Plan*.

In 1834, John MacDonald created the town plan. He placed the centre of town at the point where four townships converged, with four main roads radiating from this centre. This design was characteristic of the garden and the radiant city designs later formalized by Ebenezer Howard, Thomas Adam and Le Corbusier, some of the founders of town planning.

Figure 1—Streetscape of the Kentlands New Urbanist neighbourhood in Maryland

In 1856, the Grand Trunk Railway arrived, making Stratford a significant railway town with links to Buffalo and Lake Huron. Ironically, in 1912, the city's Queen's Park Board dissuaded the Canadian National Railway (formerly GTR) from laying tracks along the Avon River. The Queen's Park, Shakespearean Gardens and internationally recognized theatres have created a special quality of life and sense of place, with a vibrant downtown along the Avon River that is unique for a community of Stratford's size.

STRATFORD PLANNING CONTEXT

In 2002, the population of Stratford exceeded 30,000. Since 1988, Stratford's growth rate has been one per cent a year, a rate expected to continue until 2013. In 1996, Stratford started legal steps to annex land it needs for future residential growth. The city is also dealing with continued expansion of the road network between existing neighbourhoods for more efficient and effective services within the city.

In December 2000, an Annexation Order was approved to implement negotiated agreements between Stratford and townships around the city for phased annexation over several years. The objective of the *Northeast Secondary Plan* is to implement the *Court Drain Sub-Watershed Study*, address existing transportation constraints in built areas and reflect residents' vision for this new community about housing types and densities, community trail linkages, environmental preservation and continued support for the downtown.

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Figure 2—Plan of the Kentlands, Maryland, New Urbanist development

CONTEMPORARY PLANNING MODELS

The most recent school of alternative design has been the *Neo-traditional* or *New Urbanist* movement. This school promotes the building of strong neighbourhoods and liveable streets, promoting compact growth, social interaction in mixed-use communities that mimic the village concept with centre-based civic, commerce and community uses. Most planners know of the successful cases of neo-traditional development such as Seaside, Fla., where the idea first emerged, Kentlands, Md. and. Celebration. This movement, through built-examples, has acquired credibility and momentum and is embraced by numerous planners. There are critics who question the approach's effectiveness in achieving its goals and meeting consumer expectations.

In Canada, there are a number of adaptations and successes associated with new urbanist planning and design, including Cornell in Markham, Ontario and the Village in Niagara-on-the-Lake, Ontario. Planners and municipal officials have been less willing to embrace all of the elements of the neo-traditional set of tools. Public works departments, for example, have consistently raised concerns about the expense and logistics of rear lanes for snow removal and garbage pickup. These concerns aside, the fundamental principles of New Urbanism are generally workable in any climate and are espoused by most planners as appropriate for creating well-functioning communities.

Canada Mortgage and Housing Corporation (CMHC) researches community design that meets sustainability objectives, such as low environmental impact, equity and affordability. This research includes identifying principles that improve the quality of life in suburban settings by creating a better balance between pedestrian and automobile movement and by developing opportunities for public open space as critical elements in neighbourhood design.

CMHC research on suburban development and quality of life is influenced by the 18th century plan for Savannah, Ga., which is a prime example of open space use in an urban plan. Savannah's public open space is well distributed, accessible and provides significant benefit for the largest possible number of residents. Similarly, the street pattern of crescents and cul-de-sacs, when organized in a modified-grid format, provides connectivity, a hierarchy of streets for traffic efficiency and ease of orientation not often found in conventional, suburban, curvilinear street design.

It is on this basis that the Fused Grid emerged.

FUSED GRID

Fused Grid takes its name from the *fusion* of two traditional approaches to street pattern design: the conventional, curvilinear pattern of crescents and cul-de-sacs of modern suburbia, and the traditional grid pattern that evolved in North America with the Industrial Revolution. The goal of the design is a better balance between providing efficient routes for vehicular traffic and providing safety and opportunities for pedestrian activities within neighbourhoods. The Fused Grid brings together the most desired features of both conventional and traditional designs to create a people-friendly environment that combines the quality of life associated with open spaces with safe, sociable streets and easy connectivity to community facilities.

The Fused Grid pattern is a series of quadrants of roughly 16 hectares (40 acres) framed by collector streets. Within each quadrant, the residential streets (crescents and cul-de-sacs) are laid out in a modified grid to eliminate non-residential traffic. The local streets are interlinked with a central open space that is intended as a place of interaction, with opportunities for every resident within the quadrant to access the public realm. This continuous, open-space system for pedestrians provides direct access to parks, public transit, retail and community facilities. Residents can walk in any direction through the quadrant in approximately five minutes.

The central portion of the Fused Grid incorporates twinned arterial roads, within which all of the more intensive land uses are located, including schools, community facilities, higher density residential uses and places of commerce and employment. As a result, efficiencies of vehicular traffic movements are not sacrificed in the design: rather, the Fused Grid strikes a better balance of esthetics and safety for residents, efficiencies for drivers and pedestrians, and accessibility throughout a residential neighbourhood.

The Northeast Secondary Plan

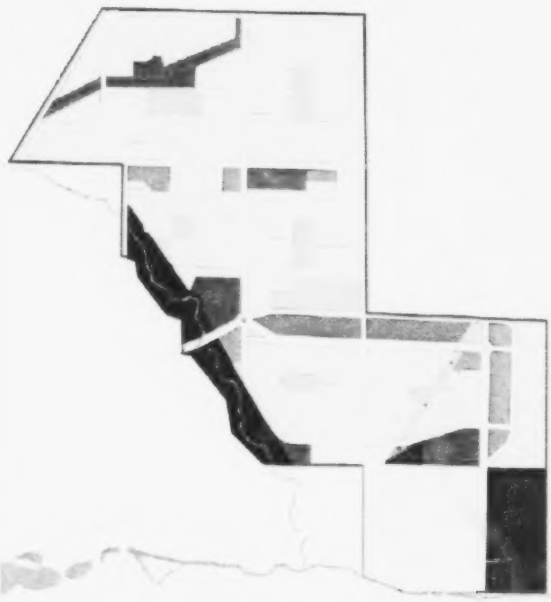
The Fused Grid model was applied as a design alternative to the *Northeast Secondary Plan* study area in the City of Stratford to determine how it would compare to two, more conventional design approaches that were being considered.

The study area was bounded by two biophysical boundaries: the Avon River and Court Drain. Two arterial roads, McCarthy Road and C.H. Meier Boulevard, were assessed through Class Environmental Assessment to determine appropriateness and alignment of extension of these roads through the study area. Existing land uses, mainly agricultural, included two woodlots. There were also residential and some commercial uses along former county roads.

The alternatives

The planning team, in consultation with the City and in response to the public participation process, developed and refined three concepts for analysis and consideration by council.

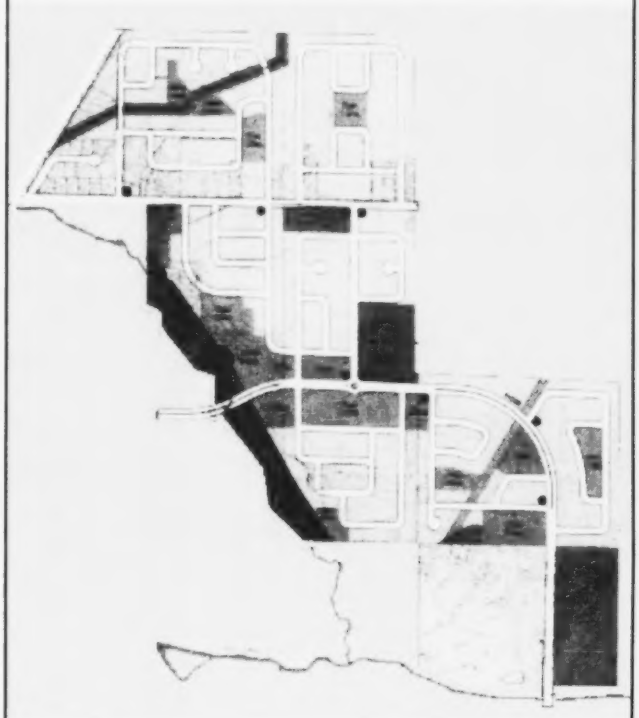
Figure 3—The proposed Fused Grid plan, a "pure" application without modifications.



Concept One applied Fused Grid planning principles without any modifications or adjustments. Concept One proposed a central corridor of twinned arterial roads where community facilities, including two school sites, public transit and medium-density residential land uses (Figure 3).

The balance of the developable lands, which were not protected, was divided into 16-ha (40-acre) quadrants, bordered by collector roads to provide accessibility to the broader arterial road network. Within those quadrants, all local streets were either crescents or cul-de-sacs that radiated outward to the collector streets. Central to each quadrant was a block of open space interconnected to each street within the quadrant.

Figure 4—The conventional suburban design



Concept Two was a conventional suburban design (Figure 4). The road pattern was curvilinear and provided the conventional hierarchy between arterial, collector and local streets. Road network efficiency was paramount in providing connectivity between places of residence and commerce–employment, with limited interconnectivity between blocks of residential development for pedestrian activities. More intensive land uses and community land uses were centered within the neighbourhood at the intersection of arterial and collector roads and parkland was dispersed throughout the community to provide close proximity to residents within walking distance.

Figure 5—The Fused Grid as modified to meet stakeholders' interests

Concept Three was based on a grid pattern of streets and, similar to the other two concepts, a central focus of community uses. A critical variation of this alternative was the incorporation of many Fused Grid key principles (Figure 5). This included:

- a grid pattern of minor collector streets at the periphery of 16-ha (40-acre) parcels.
- internal crescents and cul-de-sacs that radiated toward the collector roads.
- interconnection of internal streets within the quadrants with direct accessibility for pedestrians to open space.
- centralization of community facilities as a focal point and place of community interaction.

This hybrid Fused Grid excluded twinning roads through the central portion of the neighbourhood and the enveloping of community and more intensive land uses between the road network.

EVALUATION OF ALTERNATIVE PLANS

Typically, planners evaluate land use alternatives from the points of interest of the municipality, the development industry and the residents. Taking all of those interests into account, 16 evaluation criteria evolved to assess each of the three land use alternatives for the Northeast Community. Those criteria were based on three guiding principles: Efficiency, Quality and Impact.

Efficiency criteria

The criteria of efficiency in the use of land, infrastructure and services was assessed as follows:

- Net developable area.
- Saleable frontage.
- Percentage of land area used for roads.
- The municipal costs for road and service maintenance and reconstruction (replacement), including street cleaning, snow removal, and so on.
- Transit service and having anticipated bus stops in walkable distance.
- Matching the projected traffic generation to the road type to ensure that roads are designed to the anticipated capacity without under or over-utilization.
- Opportunities to provide service extensions to future urban growth areas.

Quality criteria

The criteria of quality of the living environment for residents was assessed as follows:

- Tranquility, measured as the prevalence of crescents and cul-de-sacs, which are deemed to be more desirable.
- Restfulness, measured by pedestrian intersections, defined as those that enable residents to get from one street to another through open space without crossing a street.
- Connectivity, measured by the frequency of block sizes, where the larger the blocks the greater the road lengths and, consequently, the greater the car speed and the lower the safety level for pedestrians.
- Opportunities for direct views to open space as a community asset.
- Accessibility to recreational parkland, measured as the shortest path to residential uses.

Impact criteria

The criteria of impact was interpreted as minimizing risk to residents and minimizing adverse affect on the natural environment, in the following ways:

- Safety for cars and pedestrians, measured by the ratio of "T" to "X" intersections, with "T" intersections shown to be safer.
- Safety for pedestrians, particularly children, measured by the number of road crossings to community land uses, such as schools and parks, as an indicator of level of safety.
- Preservation of the natural heritage inventory (woodlots, watercourses, floodplains and wildlife habitat).
- The impact of traffic noise along the arterial roads to noise-sensitive land uses.

Based on the three guiding criteria of Efficiency, Quality and Impact, the land-use concept identified as meeting all of the stakeholders' interests was Concept Three—Fused Grid hybrid.

Table 1—Comparison of the three concepts

Criteria	Concepts		
Efficiency: To provide for the efficient use of land, infrastructure and services	**One**	**Two**	**Three**
Developable area (net developable)	Low	High	Medium
Developable area (saleable frontage)	High	Low	High
Roads	Low	High	Medium
Minimize city road / servicing costs	Low	High	Medium
Transit service	High	Medium	High
Road utilization	Low	High	High
Future urban growth	High	Low	High
Overall score (efficiency)	**Low**	**Low**	**High**
Quality: To provide for a better living environment for residents and seek a stronger balance between pedestrians and automobiles	**One**	**Two**	**Three**
Tranquillity	High	Low	Medium
Pedestrian intersections	High	Low	Medium
Connectivity	High	Low	Medium
Delight	Medium	High	Low
Accessibility to recreational parkland	High	Low	Medium
Overall score (Quality)	**High**	**Low**	**Medium**
Impact: To minimize potential risk for residents and the natural environment.	**One**	**Two**	**Three**
Pedestrian and vehicular safety of intersections	Low	High	Medium
Safety of pedestrians	Low	Medium	High
Noise mitigation	High	Medium	Low
Overall score (impact)	**Low**	**High**	**Medium**

Note: The scores low, medium and high are relative to each other and do not represent proportional absolute values for the quantities measured. The actual percentage difference between them varies considerably from item to item. For the measured quantities, where the actual differences can be gauged, see the final report: *City of Stratford Northeast Secondary Plan*. City of Stratford, April 2004.

CONCLUSION AND DISCUSSION

The plan development, evaluation and approval led to the production of a report to Stratford Council that included a vision statement. The statement provided an overview of the progression of urban development that will occur in the years to come as the Northeast Community becomes an integrated part of the City of Stratford.

It embraces the design principles of the Fused Grid, noting that the lands will generally be developed with 16-ha (40-acre) blocks of local streets, divided internally by crescents and cul-de-sacs with direct pedestrian access to parkland. Community facilities will be centrally located, including the community park and proposed schools; natural areas will be preserved; and pedestrian linkages will be provided through community trails throughout the neighbourhood and provide connectivity to destinations outside of the community.

The implementation of these principles occurred through Council's adoption of "Official Plan Amendment No. 11" to the Official Plan of the City of Stratford. The Fused Grid model provided a positive influence on the conclusions of the Northeast Secondary Plan. Through subsequent subdivision and site planning processes and ultimately, build-out, it will be important to monitor the evolution of the urban development of this growth area and assess the attributes of the Fused Grid design and its influence on efficiency, quality and impact.

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Attributions: Kentlands : Site plan supplied by the Kentlands Information Centre

Figure 1. (picture): "Kentlands and the New Urbanism", Beyond DC

All other drawings: GSP group Inc.

Housing Research at CMHC

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